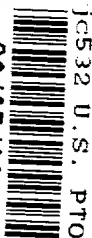


09/25/98



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PTO/SB/05 (2/98)

Approved for use through 09/30/2000. OMB 0651-0032

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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**UTILITY  
PATENT APPLICATION  
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. BEA-58 / CONT-5  
First Inventor or Application Identifier M.A. McPherson  
Title Dual-Feed Single-Cam Compound Bow  
Express Mail Label No. EM156294674US

**APPLICATION ELEMENTS**  
See MPEP chapter 600 concerning utility patent application contents.**ADDRESS TO:** Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

1. ☒ \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages 20]  
(preferred arrangement set forth below)
- Descriptive title of the invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the invention
  - Brief Summary of the invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 6]
4. Oath or Declaration [Total Pages 1]
- a. ☐ Newly executed (original or copy)
- b. ☒ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 17 completed)  
[Note Box 5 below]
- i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).
5. ☒ Incorporation By Reference (useable if Box 4b is checked)  
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Microfiche Computer Program (Appendix)
7. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
- a. ☐ Computer Readable Copy
- b. ☐ Paper Copy (identical to computer copy)
- c. ☐ Statement verifying identity of above copies

**ACCOMPANYING APPLICATION PARTS**

8. ☐ Assignment Papers (cover sheet & document(s))
9. ☐ 37 C.F.R. § 3.73(b) Statement (when there is an assignee) ☐ Power of Attorney
10. ☐ English Translation Document (if applicable)
11. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
12. ☒ Preliminary Amendment
13. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
- \* Small Entity
14. ☐ Statement(s) ☐ Statement filed in prior application, Status still proper and desired  
(PTO/SB/09-12)
15. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
16. ☐ Other: .....

\* NOTE FOR ITEMS 1 & 14: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

☒ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No: 08 / 047,481

Prior application Information: Examiner J. Ricci

Group / Art Unit: 3712

**18. CORRESPONDENCE ADDRESS**☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☒ Correspondence address below

Name	MILTON WOLSON				
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City	NEW YORK	State	NY	Zip Code	10165
Country	U.S.A.	Telephone	(212) 986-7410	Fax	(212) 983-8421

Name (Print/Type)	MILTON WOLSON	Registration No. (Attorney/Agent)	22620
Signature	<i>Milton Wolson</i>	Date	9/25/98

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# FEE TRANSMITTAL

Patent fees are subject to annual revision on October 1.  
These are the fees effective October 1, 1997.  
Small Entity payments must be supported by a small entity statement,  
otherwise large entity fees must be paid. See Forms PTO/SB/09-12.  
See 37 C.F.R. §§ 1.27 and 1.28.

TOTAL AMOUNT OF PAYMENT (\$ 790

## Complete if Known

Application Number  
Filing Date  
First Named Inventor M.A. McPherson  
Examiner Name J. Ricci (anticipated)  
Group / Art Unit 3712 (anticipated)  
Attorney Docket No. BEA-58/CONT-5

## METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:  
Deposit Account Number 11-1340  
Deposit Account Name MALINA & WOLSON  
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2. ☒ Payment Enclosed:  
☒ Check ☐ Money Order ☐ Other

## FEE CALCULATION

### 1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
101 790	201 395	Utility filing fee	790
106 330	206 185	Design filing fee	
107 540	207 270	Plant filing fee	
108 790	208 395	Reissue filing fee	
114 150	214 75	Provisional filing fee	
SUBTOTAL (1)			(\$ 790

### 2. EXTRA CLAIM FEES

Total Claims 3 -20\*\* = 0 x 0 = 0  
Independent Claims 1 -3\*\* = 0 x 0 = 0  
Multiple Dependent  =   
\*or number previously paid, if greater; For Reissues, see below

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
103 22	203 11	Claims in excess of 20	
102 82	202 41	Independent claims in excess of 3	
104 270	204 135	Multiple dependent claim, if not paid	
109 82	209 41	** Reissue independent claims over original patent	
110 22	210 11	** Reissue claims in excess of 20 and over original patent	
SUBTOTAL (2)			(\$ 0

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
105 130	205 65	Surcharge - late filing fee or oath	
127 50	227 25	Surcharge - late provisional filing fee or cover sheet	
139 130	139 130	Non-English specification	
147 2,520	147 2,520	For filing a request for reexamination	
112 920*	112 920*	Requesting publication of SIR prior to Examiner action	
113 1,840*	113 1,840*	Requesting publication of SIR after Examiner action	
115 110	215 55	Extension for reply within first month	
116 400	216 200	Extension for reply within second month	
117 950	217 475	Extension for reply within third month	
118 1,510	218 755	Extension for reply within fourth month	
128 2,060	228 1,030	Extension for reply within fifth month	
119 310	219 155	Notice of Appeal	
120 310	220 155	Filing a brief in support of an appeal	
121 270	221 135	Request for oral hearing	
138 1,510	138 1,510	Petition to institute a public use proceeding	
140 110	240 55	Petition to revive - unavoidable	
141 1,320	241 680	Petition to revive - unintentional	
142 1,320	242 680	Utility issue fee (or reissue)	
143 450	243 225	Design issue fee	
144 670	244 335	Plant issue fee	
122 130	122 130	Petitions to the Commissioner	
123 50	123 50	Petitions related to provisional applications	
126 240	126 240	Submission of Information Disclosure Stmt	
581 40	581 40	Recording each patent assignment per property (times number of properties)	
146 790	246 395	Filing a submission after final rejection (37 CFR 1.129(a))	
149 790	249 395	For each additional invention to be examined (37 CFR 1.129(b))	
Other fee (specify) _____			
Other fee (specify) _____			

\* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)

## SUBMITTED BY

Typed or Printed Name MILTON WOLSON

Signature Milton Wolson

Date 9/25/98

## Complete (if applicable)

Reg. Number 22620

Deposit Account User ID 5374

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**IN THE UNITED STATES PATENT & TRADEMARK OFFICE**  
**PATENT APPLICATION**

Applicant: MATHEW A. McPHERSON :  
Continuation of Serial No. 08/047,481 : Group Art Unit 3712 (anticipated)  
Filed: Herewith : Examiner: J. Ricci (anticipated)  
For: DUAL-FEED SINGLE-CAM :  
COMPOUND BOW :  
Attorney Docket No.: BEA-58/CONT-5 :

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

CERTIFICATE OF MAILING UNDER 37 CFR 1.10  
I hereby certify that this correspondence is being deposited with  
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*Sally W. Acevedo* 9/25/98  
Sally W. Acevedo Date  
Express Mail No. EM 156294674 US

**PRELIMINARY AMENDMENT**

Prior to the first office action with respect to the subject application, please amend  
the application in the following manner:

**In the Specification**

At page 4, lines 25, 26, please cancel "The Miller application, the serial number  
of which is not known, is believed to have been abandoned.", and insert therein --The Miller  
application, the serial number of which is not known, may be considered material to the  
examination of the subject application.--

**In the Claims**

This application is a continuation of application Serial No. 08/047,481 filed April  
19, 1993. Please cancel claims 1-34 of the originally filed claims in Serial No. 08/047,481.

Please add the following claims 35 to 37.

35. A compound archery bow comprising first and second bow limbs having axle pins therein, an anchor cable having one end fixed on the axle pin of said first bow limb and having another end fixed to an eccentrically mounted cam mounted on the axle pin of said second bow limb, said eccentrically mounted cam comprising a non-circular profile to feed out a first cable section affixed to the cam and a second cable section affixed to the cam when the bow is being drawn, and wherein one of said first cable sections or second cable sections forms a bowstring.

36. A compound archery bow as set forth in claim 35 wherein said means to feed out the first cable section and second cable section comprise first and second grooves having different peripheral lengths.

37. A compound archery bow as set forth in claim 35 wherein said means to feed out the first cable section and the second cable section comprises an eccentric groove which also takes up the anchor cable as the bow is being drawn.

Respectfully submitted,

Dated: September 25, 1998



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Milton Wolson  
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(212) 986-7410  
Attorney for Applicant

DUAL-FEED SINGLE-CAM  
COMPOUND BOW

5           This application is a continuation-in-part of U.S. Pat. Application No. '07/875,748 filed April 28, 1992 and entitled "Dual-Feed Single-Cam Compound Bow".

Background of the Invention

10           In the past, most compound archery bows have used two cams, respectively mounted on the limb tips at opposite ends of the bow to provide the means to store more energy in the draw cycle and to reduce the force necessary to hold the bowstring in the full draw position. Examples of such compound bows are disclosed in the following U.S. patents.

<u>U.S. Pat. No.</u>	<u>Issued To</u>	<u>Date Issued</u>
3,486,495	Allen	June 23, 1966
3,890,951	Jennings, et al.	June 24, 1975
4,060,066	Kudlacek	Nov. 29, 1977
4,079,723	Darlington	Mar. 21, 1978
4,112,909	Caldwell	Sep. 12, 1978
4,300,521	Schmitt	Nov. 17, 1981

15  
20  
25           The early compound bows utilized cams consisting of eccentrically mounted circular shaped elements. As the desire for more stored energy and greater arrow velocities developed, special shaped cam elements were designed to provide these characteristics. These shaped cam elements, like the circular shaped elements, were  
30 mounted on the limb tips. It is well known in the art that to obtain the best bow performance, the cam elements at each end of the bow should be properly synchronized with each other. Patents disclosing various means to accomplish proper cam synchronization include the following:

<u>U.S. Pat. No.</u>	<u>Issued To</u>	<u>Date Issued</u>
3,841,295	Hunter	Oct. 15, 1974
3,958,551	Ketchum	May 25, 1976
4,103,667	Shepley, Jr.	Aug. 1, 1978
4,178,905	Groner	Dec. 18, 1979

The more modern compound bows have reverted back to the more simplistic design of the original 3,486,495 Allen patent, but the requirement for cam synchronization is still present as noted, for example, by the teachings of the following patents:

<u>U.S. Pat. No.</u>	<u>Issued To</u>	<u>Date Issued</u>
4,372,285	Simonds	Feb. 8, 1983
4,440,142	Simonds	Apr. 3, 1984
4,909,231	Larson	Mar. 20, 1990

It is obvious, of course, that the use of a single cam avoids the problem of cam synchronization and, in fact, there are single cam bows known in the prior art. One such bow, popularly referred to as the "DynaBo" was invented by Len Subber. The original Dynabo design had one working limb located at the upper end of the bow handle. A single cam element was mounted on a rigid pylon at the lower end of the bow. The single cam element functioned in the same manner as the cam elements on the previously mentioned two cam bows. As the Dynabo was drawn, one track of the cam element payed out line to the bowstring which was fixed to the upper limb tip and the other track on the cam element acted as a take-up reel for a second line that was also anchored at the tip of the upper working limb.

Since there was only a single cam element, there was not a synchronization problem between two cams. There was, however, a problem in synchronizing the rate that the cam fed out cables to

the bowstring at the lower end of the bow and the rate that the flexing of the upper limb feed<sup>g</sup> out cable to the bowstring at the upper end as the bow was drawn. The result was a rather unpleasant feel to the bow as it was drawn and there was a drastic movement of the nocking point and the rear end of the arrow as the bow was drawn and released. This, in turn, made it very difficult to achieve good arrow flight from the bow under normal conditions. An early version of the DynaBo was described in the September 1976 edition of "Archery World" beginning at page 28.

The Dynabo single cam concept was offered in at least three different versions from as many manufacturers during the 1970's, and at least one manufacturer, Graham's Custom Bows, employed the Dynabo concept, with two working limbs. A description of the Graham bow is contained in the June/July edition of "Archery World" magazine. The Dynabo bow, however, never did become an acceptable alternative to the two cam bows and, in fact, appears to have lost whatever popularity it had achieved by the late 1970's.

Another known prior art device that had the capability of providing a solution to the previously mentioned problems of cam synchronization and synchronized bow string feed out (the latter being desirable to enable the nock end of the arrow to travel in a smooth, consistent path upon draw and release of the arrow) is set forth in U.S. Patent No. 4,562,824 issued to Jennings. This patent teaches the use of a single multiple grooved cam mounted on a pylon attached to the bow handle. The cam had one string track feeding cable attached to an idler pulley mounted in the limb tip at one

end of the bow and a second track feeding line to a second idler pulley mounted in the second limb tip at the other end of the bow. The cam also has two additional tracks, each of which are taking up line while the string tracks are feeding out line to the bow string. One take-up track is taking up a line which is anchored at one limb tip while the other take-up track is taking up a line which is anchored at the opposite limb tip. Thus, the '824 patent teaches a highly complicated system, as compared to the present invention, that is composed of considerably more parts resulting in a compound bow having greater mass weight than the more conventional two cam compound bow.

A single cam bow developed by Larry D. Miller in the late 1970's or early 1980's was the subject of a U.S. patent application titled "Archery Bow Assembly" (hereinafter referred to as the "Miller application"). The Miller application discloses the use of a single pulley, having two grooves thereon for feeding out line to the bow string. The primary groove is circular and concentric with the axle of the circular pulley. The secondary groove, also circular, may be slightly eccentric for the purpose of maintaining the nocking point of the bowstring perpendicular to the handle section of the bow. A third eccentric groove carries a take-up cable to provide the entire means of compounding (i.e. achieving the desired reduction in holding weight at full draw and storage of energy).

The Miller application, the serial number of which is not known, is believed to have been abandoned. Further, although at



least one bow was constructed which embodied the teachings of the Miller application, the applicant is unaware of the commercialization of any such bow. Thus, it is believed that the disclosure in the Miller application has been abandoned.

5

#### SUMMARY OF THE INVENTION

The present invention embodies a simple, lightweight compound bow construction which solves the cam synchronization problem of two cam bows and overcomes the problems of synchronously feeding out cable to the upper and lower ends of the bowstring. The resulting bow has a smooth, desirable nocking point travel path which enables ease in matching arrows to the bow and provides consistency in performance.

A cam is eccentrically journaled at one limb end of the bow and a pulley is journaled at the other limb end of the bow. A cable passes around the pulley to form a bowstring section and a second cable section, both sections forming a dual feed single cam compound bow. The amount of feed out to both ends of the bowstring is approximately the same. One embodiment of the drop-off cam provides a large periphery cam groove and a smaller periphery cam groove which are designed to synchronize the rate of cable feed-out at both ends of the bowstring section during the drawing operation. Other embodiments of the invention are also disclosed.

An anchor cable is provided to tie the two limbs of the bow together during the flexing of the bow. The anchor cable may be fixed at one end to the axle of the concentric pulley and at the

other end fixed in a groove in the cam to synchronize the flexing action of the bow limbs.

#### DETAILED DESCRIPTION OF THE DRAWINGS

5           Fig. 1 is a side elevational view showing one embodiment of the invention;

          Fig. 2 is a side elevational view of the cam shown in Fig. 1;

10           Fig. 3 is the opposite side elevational view of the cam shown in Fig. 2;

          Fig. 4 is a top plan view of the cam taken along line 4-4 of Fig. 3;

15           Fig. 5 is a rear elevational view of the upper limb tip portion of the archery bow of the present invention showing the anchor cable mounting on the concentric pulley axle;

          Fig. 6 is a view of the unassembled anchor cable of the present invention;

20           Fig. 7 is a side elevational view, similar to the view shown in Fig. 2, and showing an alternative embodiment of the cam of the present invention;

          Fig. 8 is a side elevational view, similar to the view shown in Fig. 2, and showing another embodiment of the cam of the present invention;

25           Fig. 9 is a side elevational view, similar to the view shown in Fig. 2, and showing a still further embodiment of the cam of the present invention;

Fig. 10 is the opposite side elevational view of the cam shown in Fig. 9;

Fig. 11 is a top plan view taken along line 11-11 of the cam shown in Fig. 10;

5 Fig. 12 is a side elevational view similar to the view shown in Fig. 2, and showing a still further embodiment of the cam of the present invention;

Fig. 13 is the opposite side elevational view of the cam shown in Fig. 12;

10 Fig. 14 is a top plan view taken along line 14-14 of the cam shown in Fig. 13;

Fig. 15 is a side elevational view similar to the view shown in Fig. 2, and showing a still further embodiment of the cam of the present invention;

15 Fig. 16 is the opposite side elevational view of the cam shown in Fig. 15; and

Fig. 17 is a top plan view taken along line 17-17 of the cam shown in Fig. 16.

20 DETAILED DESCRIPTION OF THE INVENTION

In Figure 1 of the accompanying drawings, an archery bow assembly B is illustrated which includes a central handle portion 10, having a pair of limbs 12 and 14, connected at their inner ends in fixed relation to the handle portion 10. The limbs 12 and 14  
25 provide the desired resistance to bending which determines the draw weight of the bow and the force with which the arrow is discharged.

As shown in Figs. 1-4, the outer ends of the bow limbs provide wheel receiving slots which define wheel mounting forks, respectively designated by the numbers 12a and 14a, for mounting axle pins 15 and 16. A pulley 17 is concentrically mounted on the axle pin 15. In this form of the invention, the pulley 17 is provided with a single groove. As shown in Figs. 2-4, an eccentric drop-off cam 18 is mounted on axle pin 16 and has three eccentrically oriented grooves, 18a, 18b, and 18c formed in the outer periphery thereof to provide three separate cable groove paths.

A cable 22 has a medial portion trained around concentric pulley wheel 17 to form a main cable section or bowstring 22a and a secondary or return section 22b, both of which extend across the bow and terminate at the cam 18. The ends 22c and 22d of the two sections 22a and 22b are respectively received in grooves 18b and 18c of the cam 18. The end 22c and 22d of the sections 22a and 22b are anchored to the cam 18 as by the cable anchor pins 19a and 19b fixed in said cam 18, as best shown in Fig. 3. In the form shown, three anchor pins 19a are provided to permit adjustment of the effective length of cable 22 and bowstring 22a.

An anchor cable 25 is anchored at one end 25a to the axle 15 (see Figs. 5 and 6) by loops 31 on sections 31a of anchor cable 25 encircling axle 15. It is seen that loops 31 extend on both sides of pulley 17 to provide load balancing and thus prevent twisting of upper limb 12. The other end of anchor cable 25 (as best shown in Fig. 2) passes around the cam groove 18a on the take-

up side of the cam 18 and has a loop 33 thereon which is attached to anchor pin 19c and positively ties the ends of the bow limbs 12 and 14 together to form a direct connection between the limbs 12 and 14.

5           The operation of the archery bow having the eccentric cam illustrated in Figs. 1-4 will next be described. When the archer draws the bowstring 22a, cam 18 is caused to rotate in the counterclockwise direction as viewed in Fig. 2 and bowstring 22a is fed out from cam 18 in the direction of the generally vertical  
10 arrow adjacent bowstring 22a in Fig. 1. Counterclockwise rotation of cam 18 likewise causes return section 22b to be fed out from cam 18 in the direction toward pulley 17. Return section 22b moves upwardly to the take-up side of concentric pulley 17, around and past the pulley 17 to become the second feed-out portion 22a of  
15 bowstring 22. At the same time that the bowstring section 22a is fed out, counterclockwise rotation of cam 18 causes anchor cable 25 to be taken up in groove 18a of cam 18 to cause the synchronized flexing of the bow limbs 12 and 14.

          Alternative forms of the invention are illustrated in  
20 Figs. 7 and 8, but in each case the dual-feed-out cable sections 22a and 22b operate and extend outwardly from a drop-off cam unit mounted on the limb 14 of the bow in the same manner, as described for the embodiment shown in Figs. 1-4. In the Fig. 7 embodiment, an eccentric drop-off cam 27 is illustrated having the feed-out  
25 cable sections 22a and 22b extending outwardly therefrom toward the concentric pulley 17. The cam 27 has a single groove 27b extending

all around its complete periphery with the cable sections 22a and 22b received in the groove 27b. The ends of the cable sections are anchored to an anchor pin 27a fixed to one side of the cam 27. The anchor cable 25 is also received in groove 27b and securely anchored to the anchor pin 27a, as shown in Fig. 7.

Another alternative form of the cam is illustrated in Fig. 8 which embodies eccentric drop-off cam 28 having a groove 28b thereon wherein cable sections 22a and 22b are received. A suitable anchor pin 28a is provided on the back side of the cam 28 as shown by dotted lines in Fig. 8 and both ends of cable sections 22a and 22b are secured thereto in the same manner as previously described. The anchor cable 25 is trained in groove 29 of cam 28 and secured to the anchor pin 29a of cam 28 as shown in Fig. 8. Cam 28 is eccentrically mounted on axle pin 16 connected to the limb 14 of the bow.

The embodiment of the cam shown in Figs. 9 to 11 also operates in the manner as the eccentric cam illustrated in Figs. 1 to 4. In this embodiment, the eccentric drop-off cam 30 has the feed out sections 22a and 22b extending outwardly therefrom toward the concentric pulley 17 (not shown). Feed out section 22a is received in a first groove 32 of cam 30 and feed out section 22b is received in a second groove 34 of smaller periphery of cam 30 which is located on one side of groove 32 of cam 30. Anchor cable 25, as best seen in Figs. 9 and 11, is located in groove 36 of cam 30, which also is located on the side opposite of groove 32 from groove 34 of cam 30.

Feed out section 22a, as best seen in Fig. 10, may be attached to either anchor pin 37 (as shown) or anchor pin 38 on cam 30, and in this manner the effective length of feed out section 22a may be adjusted to change draw length. Feed out section 22b, also as best seen in Fig. 10, is attached to anchor pin 40 on cam 30. Anchor cable 25, as best seen in Fig. 9, is attached to anchor pin 42 which is located on the side of cam 30 opposite anchor pins 36, 38 and 40. As in the other embodiments, cam 30 is eccentrically mounted on the axle pin 16 connected to the limb 14 of the bow.

The embodiment of the cam shown in Figs. 12 to 14 likewise operates in the manner as the eccentric cam illustrated in Figs. 1 to 4. In this embodiment, the eccentric drop off cam 44 has the feed out sections 22a and 22b extending outwardly therefrom toward the concentric pulley 17 (not shown). Feed out section 22a is received in a first groove 46 of cam 44 and feed out section 22b is received in a second groove 48 of smaller periphery of cam 44 which is located outwardly of the center line of groove 46 of cam 44. Anchor cable 25, as best seen in Fig. 12, is located in groove 50 of cam 44, which also is located outwardly of the center line of groove 46 of cam 44.

Feed out section 22a, as best seen in Fig. 13, may be attached to either anchor pin 52 (as partially shown) or anchor pin 54 or anchor pin 56 on cam 44 and in this manner the effective length of the feed out section 22a may be adjusted. Feed out section 22b, also as best seen in Fig. 13, is attached to anchor

pin 58 on cam 44. Anchor cable 25, as best seen in Fig. 12, is attached to anchor pin 60 which is located on the side of cam 44 opposite anchor pins 52, 54, 56 and 58. As in the other embodiments, cam 44 is eccentrically mounted on the axle pin 16 connected to the limb 14 of the bow.

The embodiment of the cam shown in Figs. 15 to 17 operates in the manner as the eccentric cam illustrated in Figs. 1 to 4. In this embodiment, the eccentric drop off cam 68 has the feed out sections 22a and 22b extending outwardly therefrom toward the concentric pulley 17 (not shown). Feed out section 22a is received in a first groove 70 of cam 68 and feed out section 22b is received in a second smaller periphery groove 72 of cam 68. Anchor cable 25, as best seen in Fig. 16, is located in groove 74 of cam 68, which is located intermediate of grooves 70 and 72 of cam 68.

Feed out section 22a, as best seen in Fig. 15, may be attached to either anchor pin 74 (as shown) or anchor pin 76 on cam 68 and in this manner the effective length of feed out section 22a may be adjusted. Feed out section 22b, as best seen in Fig. 16, is attached to anchor pin 78 on cam 68. Anchor cable 25, also as best seen in Fig. 16, is attached to anchor pin 80 which is located on cam 68. As in the other embodiments, cam 68 is eccentrically mounted on the axle pin 16 connected to the limb 14 of the bow.

It has been found that a desirable approach to designing the grooves in the cam is to initially have the groove which receives bowstring 22a (the "primary groove") be approximately twice the peripheral size of the groove which receives the



bowstring 22b (the "secondary groove"). The size of the primary groove may, for example, be the peripheral size of a cam on a standard bow having two independent cams. A starting point for the design of the groove which receives anchor cable 25 (the "take up groove") for use on limbs having relatively low spring rates and relatively longer limb tip travel may be, for example, to have the size and shape of the take up groove be approximately the same size and shape as the primary groove. If, however, one desires limbs having a higher spring rate and desires to reduce limb tip travel, the take up cam size will be smaller than that of the primary feed cam for a given peak draw weight. Conversely, if one desires limbs having a lower spring rate and desires to increase limb tip travel, the take up cam size would be larger than that of the primary feed cam for a given peak draw weight. The final shape of the take up cam will depend on the energy storage characteristics that are desired. Adjustments of the peripheral size and shape will then be made to the secondary groove to assure that the nocking point travels in a smooth path during the draw cycle. To achieve this, the bowstring is drawn at discrete draw length intervals, for example, at draw length intervals of one inch and at each such interval the nocking point position and travel is analyzed and, if required, the secondary groove is made either peripherally larger or smaller to assure that the nocking point travels a smooth path between intervals. By continuing this process of modifying the size and shape of the secondary groove throughout the draw length, the resulting single cam compound bow will, among other desirable

features, be provided with a smooth nocking point path of travel. It should be noted that the amount of stored energy will be directly related to the leverage ratios between the primary, secondary groove shapes and will depend on the combined effect of  
5 the two bowstring let off leverage arms as compared to the leverage arm of the bowstring take up side.

Having now described my invention and the manner in which it may be used, I claim:

1. A compound archery bow comprising a pair of flexible resilient first and second bow limbs with a handle connecting the inner ends thereof,  
a cam journaled at the first bow limb end,  
a rotational member journaled at the second bow limb end and having at least one peripheral groove portion therein,  
a cable, having an intermediate portion trained around the rotational member to form first and second cable sections,  
an anchor cable extending between the first and second bow limbs having one end fixed to the bow limb on which the rotational member is journaled and the other end secured to the cam,  
said cam having at least one eccentric groove for taking up the anchor cable as the bow is being drawn and having means for feeding out the two cable sections as the bow is being drawn, and  
means for securing the ends of the first and second cable sections and the anchor cable sections to the cam.
2. A compound archery bow as set forth in claim 1 wherein the rotational member is a pulley.
3. A compound archery bow as set forth in claim 1 wherein said first cable section forms a bowstring.
4. A compound archery bow as set forth in claim 1 wherein the

means for securing the ends of the first and second cable sections and the anchor cable section to the cam are anchor pins located on the cam.

5. A compound archery bow as set forth in claim 1 including means permitting an end of at least one of said cable sections to be lengthwise adjustably secured to the cam.
6. A compound archery bow as set forth in claim 1 wherein the means for feeding out the two cable sections as the bow is being drawn comprises at least a first additional groove and a second additional groove on said cam.
7. A compound archery bow as set forth in claim 6 wherein said first and second additional grooves have different peripheral lengths and wherein the first cable section is received in the first additional groove and the second cable section is received in the second additional groove.
8. A compound archery bow as set forth in claim 7 wherein said first additional groove has a larger peripheral length than said second additional groove, and wherein said first additional groove is located between said second additional groove and said eccentric groove of said cam.
9. A compound archery bow as set forth in claim 7 wherein the eccentric groove for taking up the anchor cable has a different peripheral length than said first and second additional grooves.
10. A compound archery bow as set forth in claim 7 including means permitting an end of at least one of said cable sections to be

lengthwise adjustably secured to the cam.

11. A compound bow as set forth in claim 10 wherein said means permitting an end of at least one of said cable sections to be lengthwise adjustably secured to the cam are anchor pins on the cam.
12. A compound archery bow as set forth in claim 1 wherein the means for feeding out the first and second cable sections as the bow is being drawn includes the eccentric groove which takes up the anchor cable section as the bow is being drawn.
13. A compound archery bow as set forth in claim 12 wherein the means for securing the ends of the first and second cable sections and the anchor cable section to the cam is an anchor pin on the cam.
14. A compound archery bow as set forth in claim 1 wherein the means for feeding out the first and second cable sections as the bow is being drawn includes an additional groove in the cam.
15. A compound archery bow as set forth in claim 14 wherein the additional groove in the cam is eccentric.
16. A compound archery bow as set forth in claim 15 wherein the first and second cable sections are secured to a first pin on the cam.
17. A compound archery bow as set forth in claim 14 wherein the anchor cable section is secured to a second pin on the cam.
18. A compound archery bow as set forth in claim 6 wherein said eccentric groove is located between said first additional

groove and said second additional groove on said cam.

19. A cam for use in a compound archery bow having means thereon to feed out a first cable section and means thereon to feed out a second cable section.
20. A cam as set forth in claim 19 wherein said means to feed out the first cable section and means to feed out the second cable section comprise first and second grooves having different peripheral lengths.
21. A cam as set forth in claim 20 wherein said cam includes a third groove having a different peripheral lengths than said first and second grooves for receiving an anchor cable section.
22. A cam as set forth in claim 19 which includes means permitting an end of at least one of said cable sections to be lengthwise adjustably secured to the cam.
23. A cam as set forth in claim 22 wherein said means permitting an end of at least one of said cable sections to be lengthwise adjustably secured to the cam are anchor pins on the cam.
24. A cam as set forth in claim 19 wherein the means for feeding out the first and second cable sections as the bow is being drawn comprises the eccentric groove which takes up the anchor cable as the bow is being drawn.
25. A cam as set forth in claim 24 wherein the means for securing the ends of the first and second cable sections and the anchor cable to the cam is an anchor pin.
26. A cam as set forth in claim 19 wherein the means for feeding

out the first and second cable sections as the bow is being drawn comprises an additional groove in the cam.

27. A cam as set forth in claim 26 wherein the additional groove in the cam is eccentric.
28. A cam as set forth in claim 27 wherein the first and second cable sections are secured to a first pin on the cam.
29. A cam as set forth in claim 28 wherein the anchor cable section is secured to a second pin on the cam.
30. A cam as set forth in claim 21 wherein said third groove is located between said first groove and said second groove on the cam.
31. A compound archery bow as set forth in claim 1 wherein said anchor cable has two sections at one end thereon, and wherein each such section is mounted on opposite sides of said rotational member.
32. A compound archery bow as set forth in claim 31 wherein each such section includes loops for affixing each such section to an axle on which the rotational member is journaled.
33. A compound archery bow as set forth in claim 1 wherein said rotational member has a single peripheral groove portion therein.
34. An anchor cable for use in a compound archery bow having two sections at one end thereof each such section terminating in a loop for affixing one end of the cable to an end of said archery bow, and a loop at the other end of said cable for affixing said other end to the other end of said archery bow.

## ABSTRACT OF THE DISCLOSURE

A cam is eccentrically journaled at one end of a compound archery bow and a pulley is journaled at the other end of the bow. A cable passes around the pulley to form a bowstring section and a second cable section, both sections forming a dual feed single cam compound bow. The amount of feed out to both ends of the bowstring is approximately the same. One embodiment of the cam provides a large radius cam groove and a smaller radius cam groove which are designed to synchronize the rate of cable feed out at both ends of the bowstring section during the drawing operation. An anchor cable is provided to tie the two limbs of the bow together during the flexing of the bow.



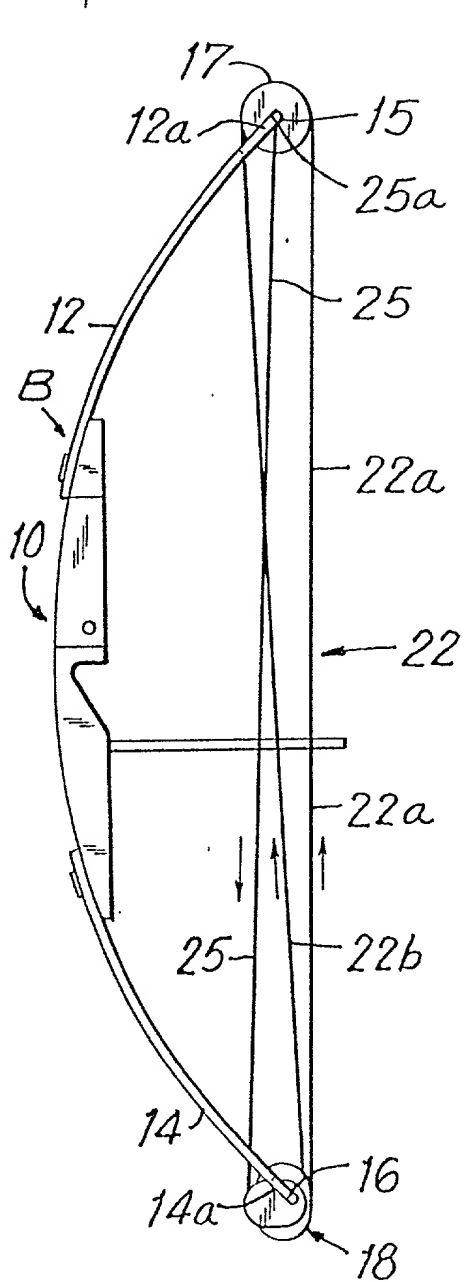


FIG. 1

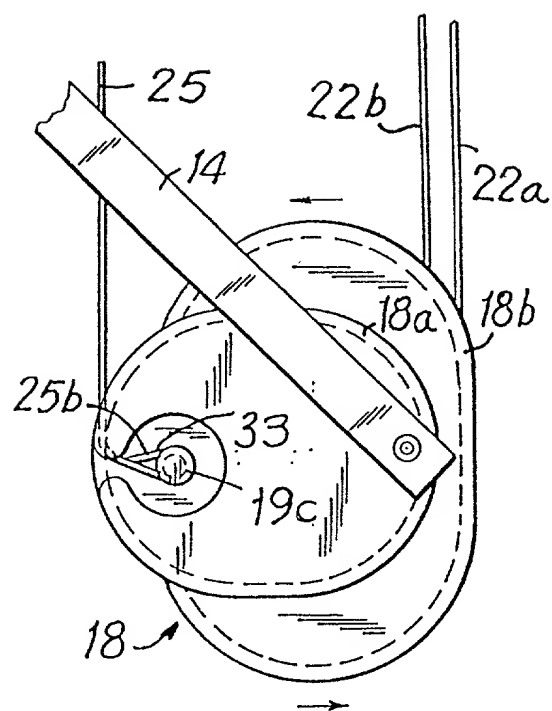


FIG. 2

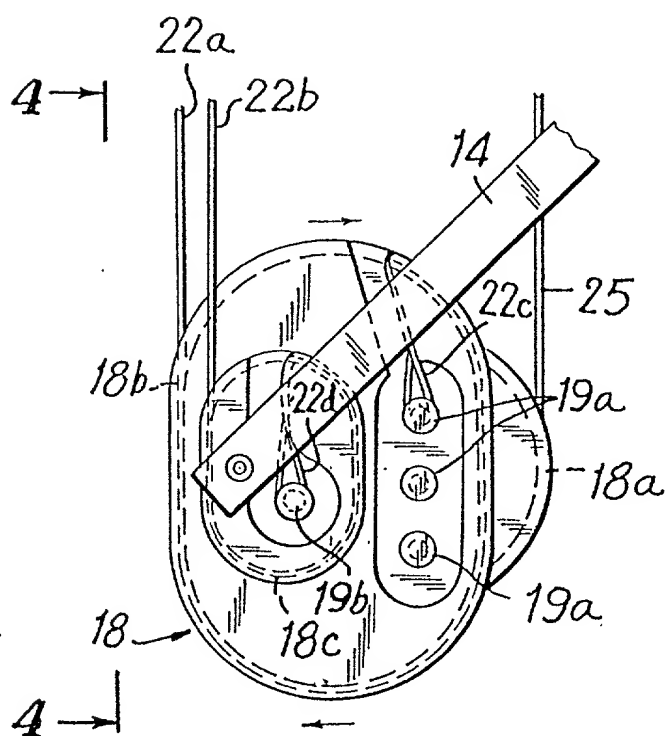


FIG. 3

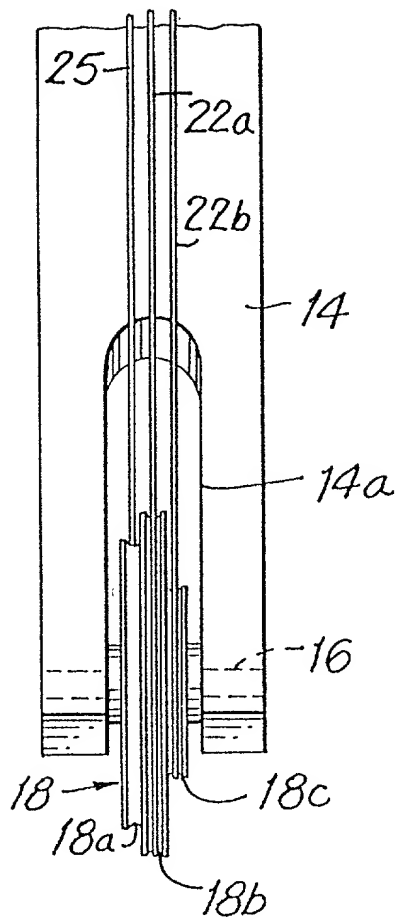


FIG. 4

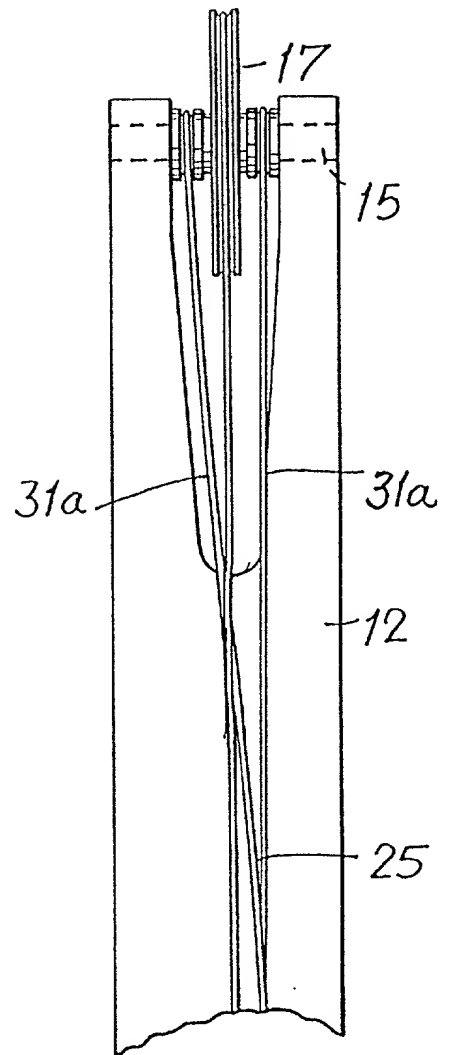


FIG. 5

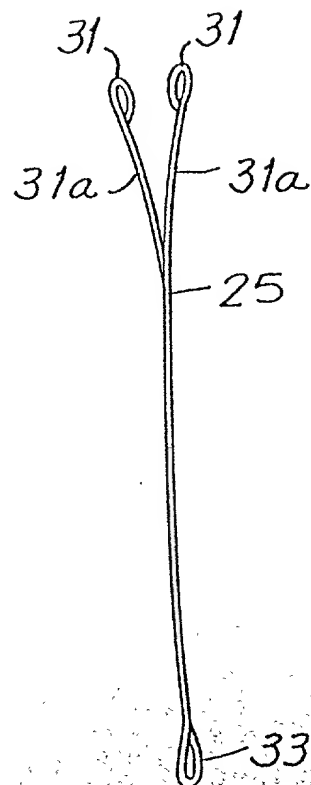


FIG. 6

FIG. 7

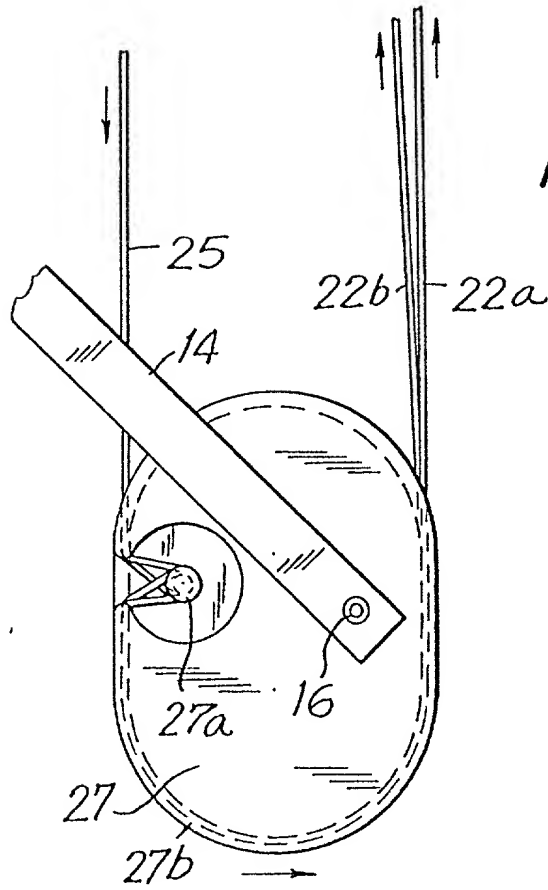
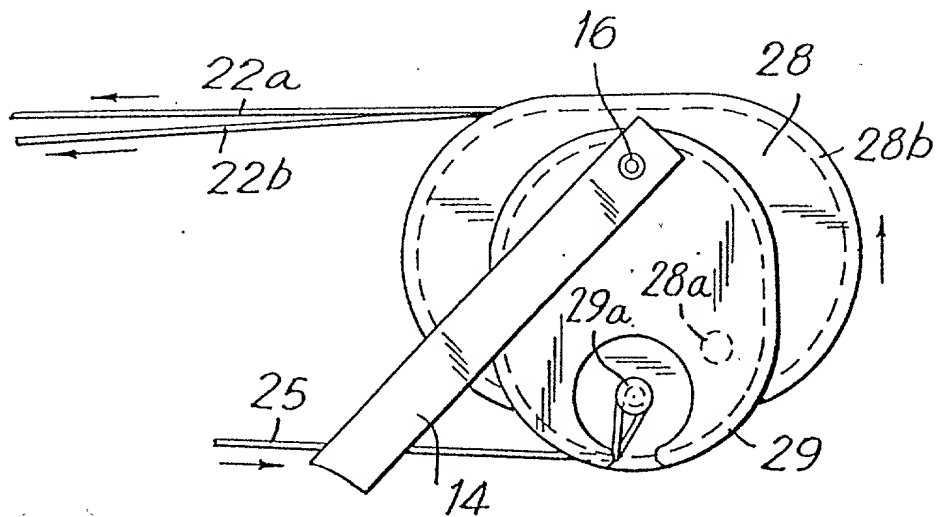


FIG. 8



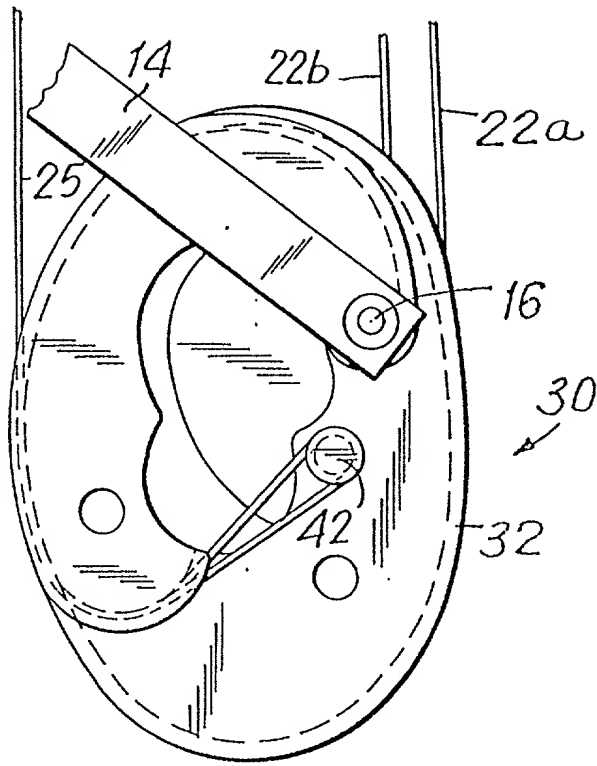


FIG. 9

FIG. 11

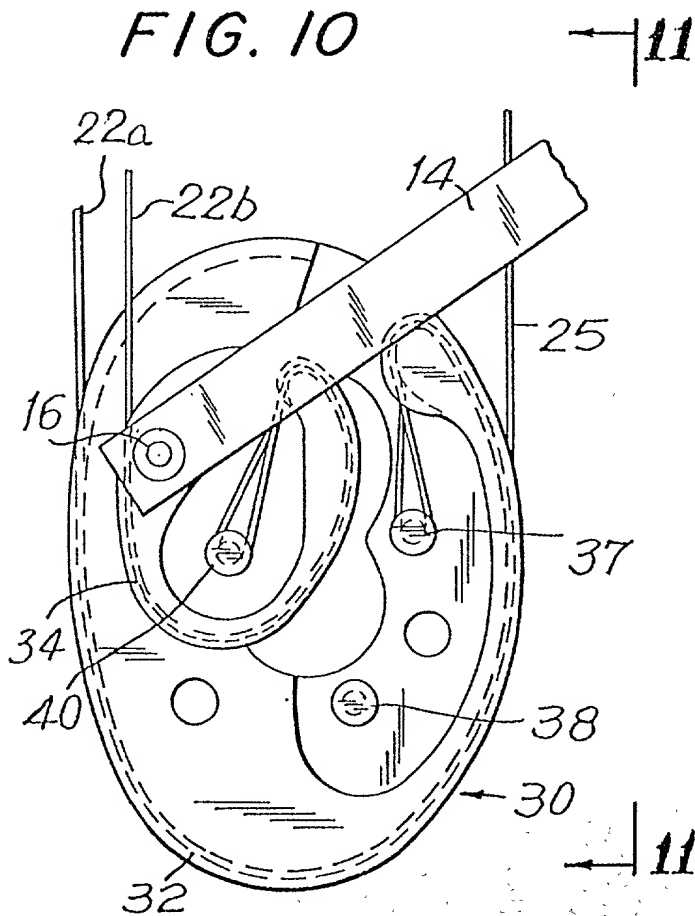
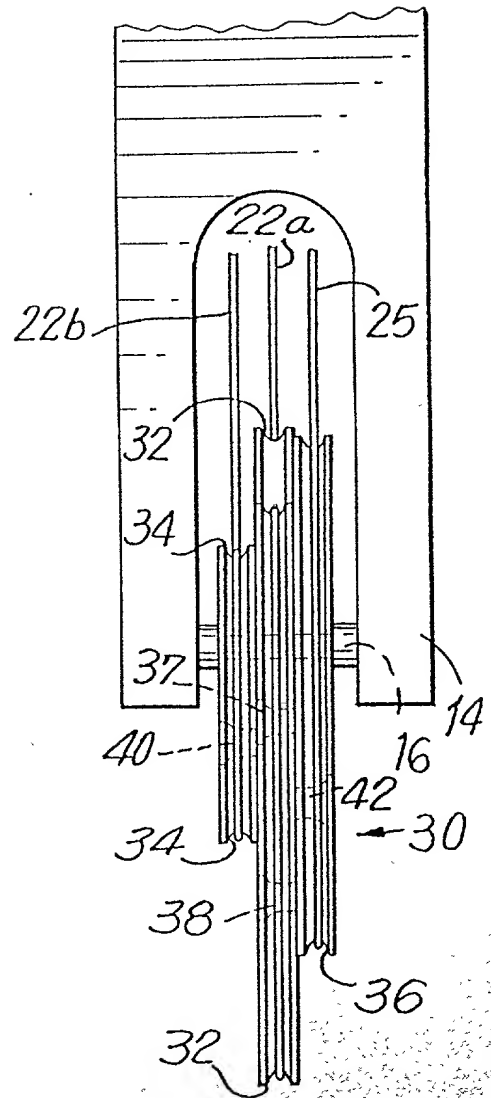


FIG. 10



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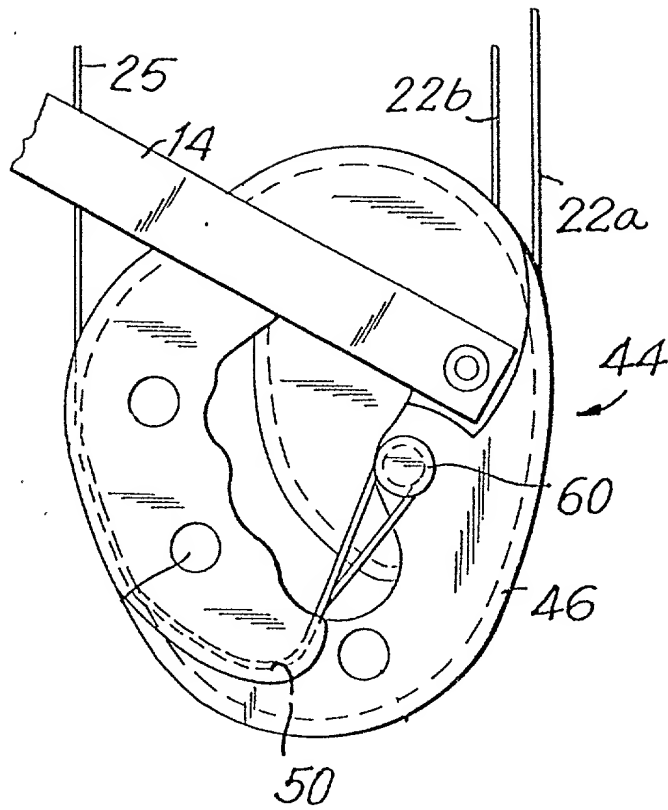


FIG. 12

FIG. 13

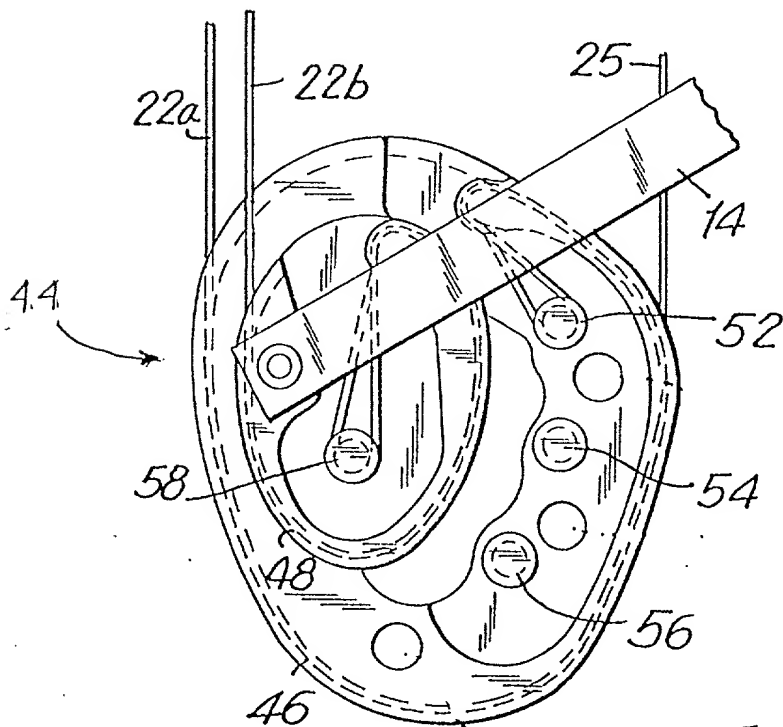
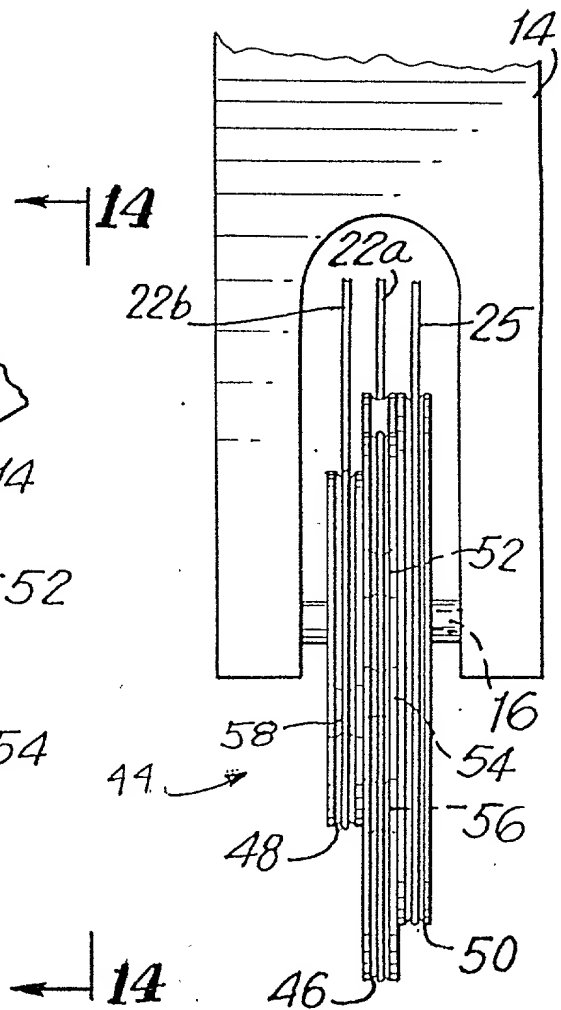


FIG. 14



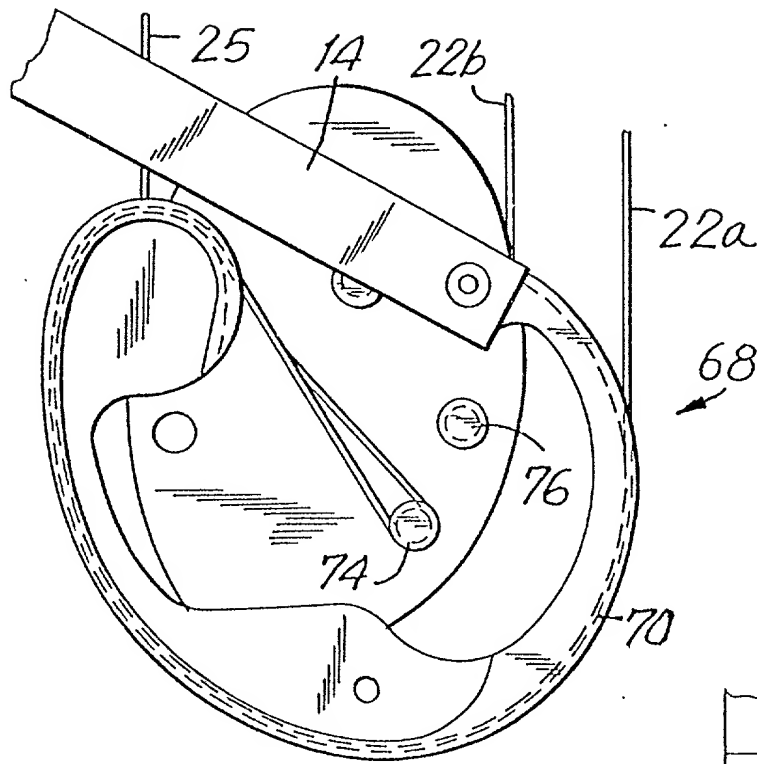


FIG. 15

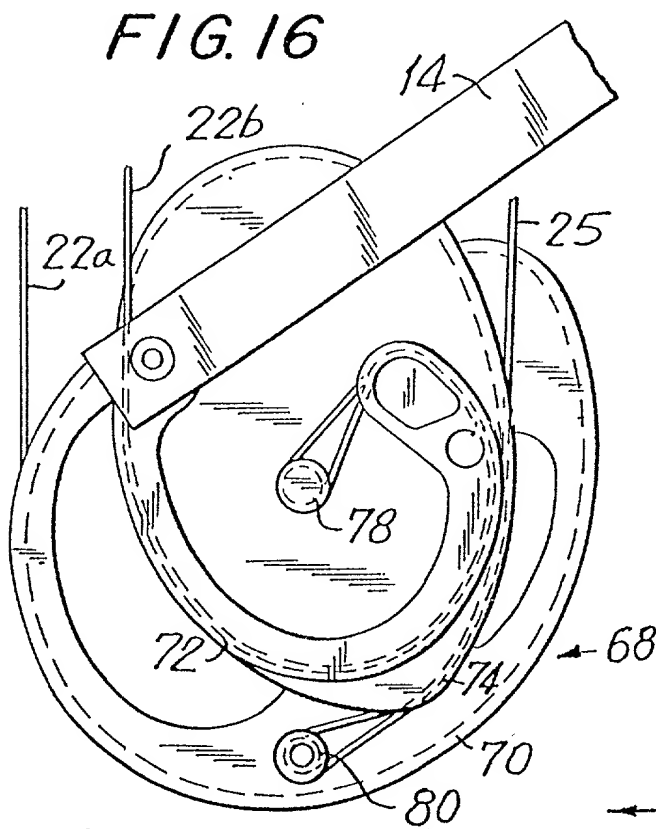


FIG. 16

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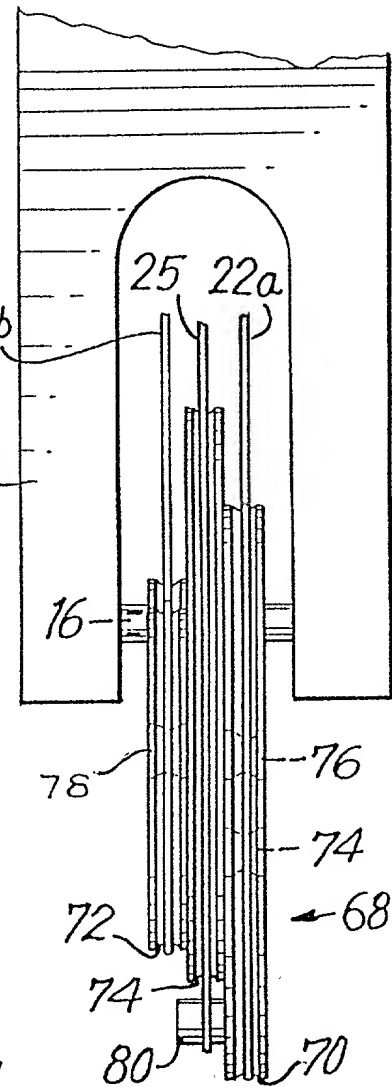


FIG. 17

## DECLARATION FOR PATENT APPLICATION

Docket Number (Optional)

BEA-58 CIP

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled  
DUAL-FEED SINGLE-CAM COMPOUND BOW, the specification of which

is attached hereto unless the following box is checked:

☐ was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

## Prior Foreign Application(s)

Priority Claimed

(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No
(Number)	(Country)	(Day/Month/Year Filed)	<input type="checkbox"/> Yes <input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

<u>07/875,748</u>	<u>APRIL 28, 1992</u>	<u>Pending</u>
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)
(Application Number)	(Filing Date)	(Status - patented, pending, abandoned)

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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60 EAST 42nd ST  
NEW YORK NY 10165

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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 Second Inventor's signature \_\_\_\_\_ Date \_\_\_\_\_  
 Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
 Post Office Address \_\_\_\_\_

☐ Additional inventors are being named on a separate sheet attached hereto.